photosphere or luminous envelope of the sun—his visible disc which is frequently named the sun himself—any diminution of this bright area which the spots or cavities produce will be attended by a reduced emission of energy. Hence a smaller quantity of light and heat is received while the spots are copious, and an augmented or normal supply when they are infrequent or absent. The total proportion of the solar radiation which the earth receives is about ^o-^-$_{OT}$n$_{J}$F(To'(r^^{ns} °f the entire supply which he emits.[1] It has been surmised that the direct diminution of light and heat from the area of the photosphere which is thus ruptured would amount to the abstraction of about the $_{TT}$^jth part of the entire quantity received; and it has further been conjectured by some scientists that compensation would be afforded by the greater quickness of the sun's circulatory processes, and consequent increase of emission produced by the disturbances of internal equilibrium, of which the eruption of spots forms a portion of the general effects. The evidence appears to be decisive that a diminished supply of heat and light is propagated to the earth during a period of spot-maximum (as the mere consideration of the structure of a spot would seem in itself to prove), thus showing that the sun is really a variable star with a period of about eleven years. Mr. S. Langley estimated that the centre of a spot emitted about 54 per cent and its edge or penumbra about 80 per cent only of the heat and light which would have been radiated from that area of the photosphere had these spots not fractured its continuity. The appreciable extent of the effect of this diminished energy upon terrestrial phenomena will be sufficiently proved in the ensuing statement of physical facts.

1. The earth is traversed by magnetic currents—directly dependent upon the heat derived from the sun—which produce the pointing of the compass-needle to the north pole (or rather at present to the west of north). At regular intervals the needle, in whatever part of the earth it be placed, undergoes violent and erratic oscillations—departing vehemently from its diurnal excursions

both in range and intensity. This is the result of a

[1] Or expressed in another form: if the sun's distribution of heat and light be divided into about 22 hundred millions of parts the earth obtains one part only.